Firms that Import in the Norwegian Industry

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Preface

This thesis is part of a larger project initiated by Alfonso Irarrazabal, professor at the Department of Economics, which I would like to thank for giving me the opportunity to write about such an interesting topic. He has also been my supervisor when writing this thesis.

Any remaining inaccuracies are mine, and mine alone.

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Summary

The last few decades has seen many studies and articles about export dynamics – how firms and industries change when opening up for trade, how firms and industries might potentially change when opening up for trade, and how firms and industries behave according to their current trade situation. Articles have been published and used to support or justify trade agreements, while other articles have been published to impair or demote the same agreements. A unifying tendency for most of these articles is that only export behaviour is analyzed, completely excluding the behaviour of firms that import.

This thesis is an attempt to shed more light on the behaviour of firms that import, by using many of the same procedures as when analyzing firms that export. Previous research has focused mainly on exporting firms, whereas this paper both describes the behaviour of importing firms, as well as exporting firms through comparisons and descriptive studies. Econometric methods are used to derive results and conclusions from a large dataset of the Norwegian industry in 2004.

In the first part I do a descriptive study of the firms in the dataset, and see how variables such as wage per worker, revenues, and trade values differ between firms that do not trade, only import, only export, and both import and export. From these summary statistics it is evident that firms that only import are a substantial part of the entire selection of firms, and that they are both more numerous than firms that only export, and generating higher revenues, wages, and value added than firms that only export and firms that do not trade. This alone would be a potential reason for assessing the significance of firms that import in an economy – in lines with firms that export. Further I perform OLS regressions to find that firms that only import seem to be situated in sectors that perform well when it comes to revenues and value added. The sector affiliation is exploited further in part II.

Part II examines the sector affiliation, and whether firms that import seem to situate in the same sectors. This part also gives a picture of the Norwegian industry, and why it is plausible for firms that import to locate in one sector or the other. Some of the most "well-known" Norwegian sectors are reoccurring, such as metal-production, chemicals production, and pulp, paper and cardboard production. These sectors might not necessarily

have the highest number of firms, but rather stand out in total import values and total export values.

In the last part I use many of the same procedures as in Eaton et al (2007), to see if firms that import behave in a different way than firms that export when it comes to the number of firms and trade partners, trade values and trade partners, and domestic sales and trade partners. By using figures one can easily compare the results between firms that import and firms that export, and I mostly find the firms that import and the firms that export to behave in a similar way. Last I see how a handful of sectors trade with different countries, to discover that import origins are often different from export destinations, which supports an inclusion of the behaviour of importing firms when performing research and making policy decisions.

I have used Stata 11 to produce all the tables and figures of the thesis, while the dataset is collected by Statistics Norway.

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1 Introduction

Trade between countries has existed for thousands of years, the Silk Road being one of the most famous examples with a history that dates back more than 3000 years[1]. For the last decades there has been done broad empirical research on the effects of trade[2], which has further been used in policy decisions. Policy makers have used the results from research to either support or demote a trade agreement, as in the case of the North American Free Trade Agreement (NAFTA)[3]. If firms that involved in trade seemed to be more productive or profitable, decision-makers could claim that by allowing more firms to trade, the economy would flourish because of higher productivities and profits among firms. In this way, empirical research on international trade becomes an important tool in politics.

Up to now, the research on international trade has focused mainly on the effects of exporting, without regarding the effects of importing. Using the words from Bernard and Jensen's "Importers, Exporters and Multinationals: A Portrait of Firms in the U.S. that Trade Goods" from 2007: "*We note that there is virtually no research documenting and analyzing importing firms".* In this thesis I will therefore try to fill some of this gap by studying international trade in the Norwegian industry, and look at the behaviour of firms that only import, as well as firms that both import and export.

I will start off by looking at the typical effects from trade: how trade behaviour affects factors such as revenues, value added, wages, capital intensities, and the number of employees in a firm. Here I compare how firms that import relates to firms that do not trade, only export, and both import and export. I will also see whether the number of trade partners in any way affects the already given variables. These are some of the typical ways of analyzing what potential free trade could create for firms that are not involved in trade to begin with, and will therefore enlighten whether import policies should be considered in the same way as export policies.

[1] http://www.silkroadfoundation.org/toc/index.html
[2] Samuelson (1954), Revenga (1997), and Bernard and Jensen (2007).
[3] Feenstra (2004)

Next I look at imports and trade within the different sectors of the industry, which will shed more light on which types of firms only import and which types of firms that both import and export. Here the trade intensities are analyzed in context of which sectors the firms belong to. As in the first part I will compare my results to earlier research on firms that export.

In the final part trade intensities will be the focal point. Here the trade partners will be identified as countries, and a handful of industries will be analyzed separately to compare the countries they export to and import from. This will further justify why import effects should be considered in empirical research on trade.

Throughout the paper I apply econometric methods to a dataset containing information about the Norwegian industry and international trade. I use the Stata 11 program in this process.

2 The dataset

The dataset I am using is derived from the Manufacturing Statistics of Statistics Norway, and the Account Statistics through the Capital Database of Statistics Norway – with numbers only from 2004. The Manufacturing Statistics gives a thorough image of the number of employees, value added, production costs, operating expenses, and investments of the various sectors of Norwegian manufacturing. The Account Statistics comprise of non-financial joint-stock companies, which also limits the selection of firms in this dataset. These statistics report the stock of tangible fixed assets in a given firm (and thereby capital costs).

The information about the firms is collected through compulsory forms filled out by the firms themselves, and also through the Brønnøysund Register Centre where all joint-stock firms must submit their annual reports. The fill-out forms allow for mistakes made by the people who fill them out, while the annual reports allow for mistakes made by auditors and accountants. Even though the selection of firms only consists of joint-stock firms in the Norwegian manufacturing, these firms had more than 80 % of value added and man-hours worked in the Norwegian industry in 2001 – which means the selection of firms will give a plausible picture of how and where values are created in manufacture.

A firm is defined as an entity owned by the same proprietor. Some of the firms included in the selection will appear as non-manufacturing (e.g. real estate activities) because companies outside the manufacturing sector can own manufacturing firms. Since the dataset reports numbers for firms in Norwegian manufacture, import values will be imports to firms in the Norwegian manufacture (e.g. intermediates). The export destinations and import origins are only given by countries – not firms or entities in the given countries.

The dataset I am applying in Stata 11 is merged and put together by Andreas Moxnes, former research fellow in the Department of Economics at the University of Oslo.

3 Part I: Firm behaviour

There has been done extensive research on the behaviour of exporting firms[4]. The research claiming exporting firms seem to be more productive and pay higher wages than non-export firms has been countered with new research that claim other variables than trading-behaviour - such as skill-intensity – is more important for wage and productivity differences[5]. I will relate much of my research on importing firms to the previous research done on exporting firms.

In this part I compare my results and analysis to that made in the pioneer-article of Bernard and Jensen on "Exporters, Jobs, and Wages in U.S. Manufacturing: 1976-1987" from 1995. They evaluate how the export status of firms affects the characteristics of firms and the labour market, and find that firms that export pay higher wages per employee, are more productive, have higher capital and investment per worker, and generally employ more labour.

I will concentrate on the characteristics of firms and – in accordance with my problem - evaluate how firms that import differ from other firms. I choose to divide the firms into: only import firms, only export firms, both import and export firms, and firms that do no trade at all. I will further control for the size of the firms, and which sector they belong to. In this way I will find out if the differences in the summary statistics have to do with the size of the firms and the industries they are in, rather than which type of trade they are involved in. This has also been done in the Bernard and Jensen (1995) article to firms that export.

In the second section I will look at how firm behaviour changes by the number of trade partners (or the number of countries) each firm trades with. The effect of trade partners on different variables is something that will be recurring throughout the paper. Similar studies on the effect of trade intensities have been made by Bernard, Jensen and Schott (2007), and Eaton, Kortum and Kramarz (2008).

[4] Bernard and Jensen(1995), Bernard and Jensen(1997), and Aw and Hwang(1995) to name a few.
[5] Schanck, Schnabel and Wagner (2006)

3.1 Summary of firm behaviour

Table 1. Summary statistics for the selection of firms.

Type of trade	Number of firms
No trade	2803
Export	275
Import	2285
Export&import	2985
Total	8348

As can be seen from table 1; in the selection of firms from the Norwegian industry there are 2803 (34%) firms that do not trade, 275 (3.3%) firms that only export, 2285 (27%) that only import and 2985 (36%) that both export and import. This means that there are far less firms that only export, than those that only import, and the share of firms that only import are just 9 percentage points below the percentage of firms that both import and export. From these results it is interesting to know more about how the share of employees, total wage, value added, investments, capital costs, revenues, domestic sales, import values, and export values in the Norwegian industry are divided between the four groups. The summary statistics for this are displayed in table 2 and 3 below.

Table 2. Summary statistics for the share of total values in the given trade groups.

Type of trade	Share of employment(%)	Share of wage(%)	Share of value added(%)	Share of investments(%)	Share of capital costs(%)
No trade	8.92	7.23	7.70	5.14	6.16
Export	1.10	0.86	0.91	0.25	0.96
Import	14.4	11.7	11.3	9.27	12.0
Export&import	75.6	80.2	80.1	85.3	80.9

Table 3. Summary statistics for the share of total values in the given trade groups.

Type of trade	Share of revenues (%)	Share of domestic sales(%)	Share of imports(%)	Share of exports(%)
No trade	5.51	7.27		
Export	0.73	0.88		0.26
Import	9.09	12.0	2.23	
Export&import	84.7	79.8	97.8	99.7

Starting with table 2 it is obvious that firms that both import and export inhabit a large share of total values in the Norwegian industry. Firms that only import were only 9 % points smaller than firms that both import and export in the number of firms, but when it comes to the share of total workforce they are 61 % points smaller. Also firms that do not trade are very small compared to the number of firms – 8.92 % in the share of total employment and 34 % by the number of firms. This could imply that each firm that both import and export employ more people than other firms.

Through and through firms that both import and export have a substantial share of wages, value added, investments and capital costs in the Norwegian industry – with 75 % and up. Firms that only import have around 10 % of total shares, and are persistently reporting higher shares than firms that do not trade and firms that only export. Having larger shares than firms that do not trade is not bad, considering how firms that do not trade are more plural than firms that only import. Firms that only export have very low shares, which is not surprising given the low share of firms that only export.

In table 3 the share of revenues and share of domestic sales are showing the same tendency as in table 2; firms that export and import have a substantial share of total values, while firms that only import are doing better than firms that do not trade and firms that only export. The share of import values are largely dominated by firms that both import and export with 97.8 %, while firms that only import have only a share of 2.23 %. The difference here between firms that only import and firms that both import and export is much larger than for the other variables, and could imply a much larger value of imports for each firm that both imports and exports than for firms that only import. For the division of export values the difference is even larger, and could be explained by the same reasoning as in the case of import values – in addition to the number of firms that only export compared to firms that both export and import.

These findings are relevant when assessing how different firms in the industry contribute to the Norwegian economy by, per se: explaining how many percentages each group employs, how high revenues they contribute with to the

society and how they stimulate further growth through the size of their investments. From table 2 and 3 it looks as though firms that import have persistently higher shares of the given values than firms that do not trade, even though there are more firms that do not trade than firms that only import. To get a better picture of the contributions per firm – and being better able to see whether firms that both export and import are in fact exerting higher values per firm than firms that only import, and firms that only import higher values per firm than firms that do not trade - table 4 and 5 display mean values per firm in the various trade groups already mentioned.

Table 4. Summary statistics for mean workers per firm, mean wage per worker (in 1000 NOK), mean value added per worker (in 1000 NOK), mean capital costs per worker (in 1000 NOK), and mean investments per worker (in 1000 NOK).

Type of trade	Workers per firm	Wage per worker	Value added per worker	Capital costs per worker	Investments per worker
No trade	7.27	347	532	132	56.7
Export	9.12	328	640	127	-16.4
Import	14.4	349	672	360	68.4
Export&import	57.8	416	649	130	38.9

Table 5. Summary statistics for mean revenues per firm (in 1000 NOK), mean domestic sales per firm (in 1000 NOK), mean imports per firm (in 1000 NOK), and mean exports per firm (in 1000 NOK).

Type of trade	Revenues per firm	Domestic sales per firm	Imports per firm	Exports per firm
No trade	9900	9900		
Export	13375	12210		1165
Import	20059	20059	738	
Export&import	102101	102101	24808	40854

Table 4 and 5 presents the mean values per firm for the same variables as in table 2 and 3, only here wage, value added, investments and capital costs have been changed to values per worker. The mean number of employees per firm is larger in importing firms than in firms that do not trade, and far larger in firms that both import and export. The assumption that firms that both import and

export are employing more people per firm than firms that only import thus seems correct.

The summary statistics of the other variables show that wage per worker has a higher mean for firms that do not trade than firms that only export, while wage per worker increases in import firms, and reaches its peak in firms that both export and import. Value added per worker shows a dissimilar trend, where only importing firms report the highest value added per worker, exporting and importing second highest, while only export and non-trade comes third and fourth respectively. Also with regards to investments per worker and capital costs per worker; firms that only import seem to have higher mean values than all the other trade groups – also than firms that both import and export.

A peculiarity is that investment per worker has a negative value for firms that only export. This can be explained by the way this variable is calculated[6]: this year's purchases of long-lived goods less this year's sales of long-lived goods. It thus seems as though exporting firms – on average – have sold more long-lived goods than what they have bought.

Revenues, on the other hand, are five times higher in firms that both import and export than in firms that only import, but firms that only import are still performing far better than firms that only export and non-trading firms. Domestic sales behaves very similarly, while the value of imports are almost 34 times larger in firms that both export and import than in firms that only import. The same goes for the relationship between firms that only export and firms that both import and export with regards to export value.

A variable that clearly stands out for firms that only import is the capital costs per worker. It is almost three times larger than that of the other groups, and might be explained by the production pattern in firms that only import. Suppose that firms that only import are importing labour intensive intermediates from labour abundant economies, and mostly performing tasks that require much capital in their own production – in response with the Ricardian and Heckscher-

[6] Taken from the document of the Manufacturing Statistics

Ohlin theories on comparative advantage between countries[7], which claims that countries will export the goods they have comparative advantage in and import the goods they do not (assuming the Norwegian industry has comparative advantage in capital-intensive production). If this is the case, one could assume that firms that only import are far more capital-intensive than other firms.

The simple summary statistics from table 4 and 5 imply that firms that only import actually perform in a better way than firms that both export and import when it comes to value added, investments and capital costs per worker. In every variable they report higher values than firms that only export, and firms that do not involve in trade.

Table 4 and 5 show that firms that only export are not strikingly different from firms that do not trade. This is different from the results in Bernard and Jensen (1995) where firms that exported displayed a clear tendency in the direction of them performing better than other firms. This probably has its most natural explanation from the fact that here there is a separation between firms that both import and export, and firms that only export, while Bernard and Jensen (1995) included everyone in the same group. By including firms that only export in the group of firms that both export and import in the summary statistics of table 4 and 5: given the low number of firms that only export relative to those that do both, the results of firms that both import and export would probably not change too much.

3.1.1 Size and sector affiliation in relation to firm behaviour

Earlier research on the effects of trade in firms has been concerned with whether the performance of exporters has been an outcome of allowing the firm to export, or if the firm has started exporting because it was already an "exceptional" performer in the domestic market[8]. As mentioned this was something Bernard and Jensen (1995) also tried to mend for in their article through an OLS regression. By comparing firms that are of the same size, and in the same sector, it will clarify if firms that trade are performing better than firms that do not trade just because they are bigger and belong to a more profitable

[7] Feenstra (2004)
[8] Bernard and Jensen(1997)

sector of the Norwegian industry – or simply because firms that trade perform better than other firms.

By performing an OLS regression where the size of the firm and sector affiliation are kept constant through inclusion of these variables in the regression equation, we will see if wage per worker, value added per worker, investment per worker, capital costs per worker, revenues per firm, domestic sales per firm, exports per firm and imports per firm are affected by whether a firm is only importing, only exporting, or both importing and exporting. Workers per firm is used as a proxy for firm size, while trade situations of the firms are included as dummy-variables – no trade being the benchmark group. Sector affiliation is also a dummy-variable, where given NACE-codes in the dataset are used to define which sector each firm belongs to. The equations for the OLS regressions are of the form:

$$\log(X) = \beta_{0x} + \beta_{1x*}\text{import} + \beta_{2x*}\text{export} + \beta_{3*}\text{exp\&imp} + \beta_{4x*}\log(\text{workers}) + \beta_{5x*}\text{sector} + \varepsilon_x \quad (1)$$

where: X = {wage per worker, value added per worker, investment per worker, capital costs per worker, revenues per firm, domestic sales per firm, import value per firm, export value per firm}

The dependent variables (represented by X) are in logarithmic scale. β_{0x} is the intercept-coefficient, while β_{1x} is a dummy-coefficient for firms that only import, β_{2x} is a dummy-coefficient for firms that only export, and β_{3x} is a dummy-coefficients for firms that both import and export. β_{4x} is a coefficient for the size of the firms – or the number of workers per firm – which is also in logarithmic scale. β_{5x} is a dummy-coefficient for which sector the firms are in, and ε_x is a random error term.

Table 6. The coefficients for importing, exporting or doing both gives the percentage difference – when multiplied by 100 – in wage per worker, value added per worker, capital costs per worker, and investment per worker, compared to firms that do not trade.

	Dependent variables			
Trade dummies	Wage per worker	Value added per worker	Capital costs per worker	Investments per worker
Import	0.002	0.061	0.237	0.174
	(0.89)	(0.00)	(0.00)	(0.00)
Export	0.002	0.120	0.292	0.056
	(0.96)	(0.00)	(0.00)	(0.61)
Export&import	0.108	0.244	0.468	0.449
	(0.00)	(0.00)	(0.00)	(0.00)
N	8272	8181	8248	5788
R^2	0.053	0.028	0.044	0.034

Dependent variables are in logarithmic scale, and p-values are in parentheses.

Table 6 shows the result of testing the hypothesis: trading behaviour has zero effect on the variables wage per worker, value added per worker, capital per worker, and investment per worker - when size and industry are held constant[9]. P-values are given in the parentheses, and shows the possibility that the effect from trading behaviour is actually zero. When p-values are smaller than 1 %, the coefficients are assumed unlikely to be zero.

Beginning with wage per worker: The import dummy has an 89 % probability of being zero, while the export dummy has a 96 % probability. They are therefore very likely to be zero, and thereby firms that only import and only export have no difference in wage per worker compared to firms of the same size and in the same sector, that do not trade. The coefficient for firms that both import and export have less than 1 % probability of being zero, and one can thus assume that firms that both import and export have a 10.8 % higher wage per worker than firms that do not trade – size and sector accounted for.

In value added per worker all the coefficients are significant at a 1 %-level, and the same goes for capital costs per worker. From the summary of table 4 one assumes that firms that import would have the largest coefficients in the

[9] Wooldridge(2009)

regressions for value added and capital costs per worker, but this is not the case in the regressions in table 6. The import coefficients actually have the lowest values for both value added per worker and capital costs per worker. By looking at firms that both import and export, they have almost 50 % higher capital costs per worker than firms of the same size and in the same industry that do not trade.

For investments per worker the coefficient for firms that only export is significant at a 61 %-level, so it is very likely to be zero. For the other two trade-groups the coefficients are significant at a 1 %-level. Firms that only import have a coefficient with a value of 17.4 %, while firms that both import and export have 45 % higher investments per worker than the benchmark group.

By analyzing the effects of trade behaviour between firms of the same size and in the same industry, the results we get are somewhat different from the results in the summary statistics. The high value of capital costs per worker shown in table 4 for firms that only import could - from the result of this regression - have something to do with the sector firms that only import are situated in, and that this sector has a relatively high capital intensity compared to the other sectors (the same goes for value added per worker and investments per worker). The sector affiliation of the different firms and trade groups will be presented further in part II.

The number of observations for each regression is also cited in table 6. Here the regression for investments per worker has far less observations than the other regressions, and this could be because firms have not reported their annual investments in the sheets and reports collected by Statistics Norway, or it could simply be because some firms did not perform any investments the concerning year of 2004.

The value of the R^2 explains the percentage of the variation in the dependent variable that is explained by the independent variables[10]. By looking at the R^2-values of the four regressions in table 6, it is obvious that the variables included in the regression equations are far from enough to give a complete picture of

[10] Wooldridge(2009)

how the dependent variables end up like they do. Between 2.8 % and 5.3 % are explained by the number of workers (or size), the sector they belong to and the trade situation for the dependent variables in table 6. These are very low percentages which means that other independent variables than those that are given here affect the formations of the dependent variables.

Table 7. The coefficients for importing, exporting or doing both gives the percentage difference – when multiplied by 100 – in revenues per firm, domestic sales per firm, imports per firm, and exports per firm, compared to firms that do not trade.

	Dependent variables			
Trade dummies	Revenues per firm	Domestic sales per firm	Imports per firm	Exports per firm
Import	0.002	0.218	-2.091	
	(0.00)	(0.00)	(0.00)	
Export	0.262	0.172		-0.571
	(0.00)	(0.00)		(0.00)
Export&import	0.551	0.345		
	(0.00)	(0.00)		
N	8294	8294	5255	3252
R^2	0.797	0.746	0.406	0.302

Dependent variables are in logarithmic scale, and p-values are in parentheses.

In table 7 all coefficients are significant at a 1 % significance level – given the p-values in the parentheses. Both revenues and domestic sales seem to be larger for firms that do any type of trade than for non-trading firms when size and industry is kept constant. Firms that only import have, however, only 0.2 % higher revenues than firms that do not trade. Comparing to firms that both import and export; they have 55.1 % higher revenues per firm than firms that do not trade. Firms that only export are also displaying a far higher value than firms that only import with 26.2 % higher revenues per firm than firms that do not trade. This is different from the summary statistics in table 5 where firms that only import had higher mean values of revenues per firm than firms that only export. Domestic sales are more similar to the summary statistics in table 5; the

highest value is for firms that both import and export, second for firms that only import, and third for firms that only export.

In imports per firm, firms that both import and export are used as the benchmark group since firms that do not trade do not report import values. Table 7 shows that firms that only import, and are of the same size and in the same sector as firms that both import and export, will have more than 200 % lower import values per firm than firms that both import and export. This is in coherence with the summary statistics in table 5 where firms that only import had far lower import values than firms that both import and export. More or less the same result is given for export values per firm, only here the coefficient for firms that only export is less negative than in the case of import values.

The number of observations for the regressions of import values and export values per firm are lower than for the other two variables in table 7, and this can be explained by the number of firms that import and export: Firms that do not trade will report no trade values, and firms that only export and only import will show zero export and import values respectively. Revenues per firm and domestic sales per firm display surprisingly high R^2-values of 80 % and 75 %, which means that the variation in these dependent variables can be heavily explained by the number of workers in a firm, the sector they are in, and what type of trade they are involved in. The R^2 for import and export values per firm are also quite high, at 40.6 % and 30.2 % respectively.

By performing the OLS regressions on equation (1), firms that only import often perform poorer than firms that only export. This is in disparity to the results in the summary statistics in table 4 and 5. Firms that both import and export are consistently displaying higher coefficients than firms that only import, which was not the case for all variables in table 4. This could imply that firms that only import were initially performing better than firms that only export (and sometimes also better than firms that both import and export) because of the size of firms that only import, and the sector they are in. All in all, comparing these results to the OLS regressions of Bernard and Jensen (1995), firms that

only import have many of the same features as firms that export in their article – which they find to perform better than firms that do not trade.

This being said: there is uncertainty associated with doing an OLS regression, and other variables than trade situation, size and sector will especially affect wage per worker, value added per worker, investments per worker and capital costs per worker. And even though the selection of firms is large, by forcing the firms into groups of same size and industry, there might not be too many observations for each group – which will particularly affect firms that only export since they are few to begin with. The discovery of lower performance for firms that only import versus firms that only export must therefore be assessed with caution.

3.2 Firm behaviour by trade partners

Another interesting analysis is to look at how firms behave with respect to the number of countries they trade with. By using the same variables as already introduced, mean values for different intervals of trading partners are summarized, where the trade partners can both be countries they import from and/or export to. A similar study was made by Bernard and Jensen (2007) on a firm's effect from having a given number of trade partners, where they found the number of workers, value per firm and value per worker to increase with the number of export trade partners and the number of import trade partners.

Firms that only export are excluded because there are very few observations for each interval of trade partners. The same goes for firms that only import with more than ten trade partners. The results are presented in table 8 and 9.

Table 8. Summary statistics for trade partners in firms that only import and firms that both import and export. The rows give values of the variables mean workers per firm, mean wage per worker (in 1000 NOK), mean value added per worker (in 1000 NOK), mean capital costs per worker (in 1000 NOK), and the number of firms - for given numbers of trade partners.

Firms that only import

Trade partners	Workers per firm	Wage per worker	Value added per worker	Capital costs per worker	Firms
1	11	338	498	107	985
2	11	359	559	148	501
3-5	13	349	1105	1042	586
6-10	43	381	536	155	175

Firms that both export and import

Trade partners	Workers per firm	Wage per worker	Value added per worker	Capital costs per worker	Firms
1	12	367	700	160	94
2	11	333	519	119	261
3-5	17	374	579	123	744
6-10	37	411	621	127	814
11-20	76	434	698	137	677
21-49	154	531	804	135	347
50+	434	604	1012	167	48

Bernard and Jensen (2007) reported a decrease in the share of firms by the number of trade partners. This is not as consistent here, especially not for firms that both import and export. Employees, wage per worker, value added per worker and capital per worker are mostly increasing with the number of trade partners for firms that both import and export. The results are less conclusive for firms that only import.

Table 9. Summary statistics for trade partners in firms that only import and firms that both import and export. The rows give values of the variables mean revenues per firm (in 1000 NOK), mean import value per firm (in 1000 NOK), mean export value per (in 1000 NOK), mean import value per trade partner(in 1000 NOK), and mean export value per trade partner(in 1000 NOK) - for given numbers of trade partners.

Firms that only import

Trade partners	Revenues per firm	Imports per firm	Exports per firm	Imports per trade partner	Exports per trade partner
1	14120	171		171	
2	18434	521		260	
3-5	21109	1062		280	
6-10	47649	2700		367	

Table 9 continued.

Firms that both export and import

Trade partners	Revenues per firm	Imports per firm	Exports per firm	Imports per trade partner	Exports per trade partner
1	16721	936	508	936	508
2	15257	1491	746	745	373
3-5	29791	2126	1086	537	281
6-10	75438	5915	5353	750	655
11-20	152499	22833	25198	1498	1663
21-49	492665	114719	190867	3502	5369
50+	1920829	248155	692742	3727	10289

Table 9 displays the variables for revenues, import value, export value, and two new variables: imports per trade partner and exports per trade partner. The last variables are added to see whether the values of traded goods per destination increase or decrease with the number of destinations per firm. The variables here are much more conclusive in their results, and mostly seem to be increasing with the number of trade partners – both for firms that import and export as well as for firms that only import. The exceptions are the values for import and export per destination: firms that both import and export have quite high values at one and two trade partners, lowest for 3-5 trade partners and then higher values again.

The main conclusion from comparing firms that only import to firms that both import and export with regards to trade intensity is that they mainly express the same qualities – similar to those in Bernard and Jensen (2007) – except for wage, value added and capital costs per worker, and export and import value per destination. It is interesting to see that both export and import values are more or less increasing with the number of trade partners, which means that firms are trading more with each destination, as the number of countries they trade with increase.

To better compare the results in table 8 and 9 to those in Bernard and Jensen (2007), trade status should be divided in the same way as the U.S. study, where import and export are divided into groups independent of whether they are only importing and exporting or doing both. It will thus be easier to see if Norwegian

firms that trade actually behave in a different way. Only wage per worker, capital costs per worker, value added per worker, and import value per destination are included.

Table 10. Summary statistics for firms that import (only import and both import and export), by the number of trade partners. All values are in 1000 NOK but the number of firms.

	Firms that import				
Trade partners	Wage per worker	Value added per worker	Capital costs per worker	Import value per destination	Number of firms
1	341	516	111	238	1079
2	350	545	138	427	762
3-5	363	811	528	424	1330
6-10	405	606	132	682	989
11-20	428	695	137	1439	713
21-49	530	803	135	3482	349
50+	604	1012	167	3727	48

Also from table 10 it seems as the number of firms does not decrease consistently with the number of trade partners – this is of course affected by larger intervals of trade partners after two trade partners is exceeded. This effect will be examined closer in section 5.1. Capital costs per worker and value added per worker do not behave in a consistent way either, while wage per worker and import per destination are increasing with trade intensity.

Table 11. Summary statistics for firms that export (only export and both import and export), by the number of trade partners. All values are in 1000 NOK but the number of firms.

	Firms that export				
Trade partners	Wage per worker	Value added per worker	Capital costs per worker	Import value per destination	Number of firms
1	338	620	134	328	268
2	336	528	121	624	312
3-5	372	601	124	513	778
6-10	409	620	127	735	830
11-20	434	698	137	1498	677
21-49	531	804	135	3502	347
50+	604	1012	167	3727	48

Firms that export are displayed in table 11. As with table 10; the results are not as satisfying as in the Bernard and Jensen (2007) article. Wage per worker is more or less increasing with the number of trade partners, and the other variables are doing the same with some exceptions. This means that even when the trade groups are divided in the same way as for Bernard and Jensen (2007) there are some dissimilarities between the results. This could be because Norwegian firms behave differently than U.S. firms, because the intervals for more than two trade partners are somewhat different from those, because their article includes data from a wider spectre of firms (not only manufacturing), or because they have 5 million firms in their dataset while this dataset only contains about 8,500 firms.

4 Part II: Trade by industries

In this part I will look more into which industries the different firms belong to. As explained in the description of the dataset, some of the firms have industry codes that seem to belong outside of the Norwegian manufacturing, but will still belong in the industry classification because the firm owns an entity that does manufacturing activities. The classifications of the NACE codes are downloaded from the web pages of Statistics Norway[11]. I have shortened the code from four to two digits in order to exclude the details of what activities the firms are doing within the different sectors.

The OLS regressions I did in Part I showed that some of the superior attributions in table 4 of firms that only import versus firms that only export and firms that both import and export disappeared when I kept size and industry constant. Industry affiliation has been important when evaluating the gains from trade in earlier research, and assessing how wages change when countries open up for trade[12]. Even though my data limits me from comparing wages between low-skilled and high-skilled labour in the firms that trade (I do not have information about which skills the labour inhabits), I can find out more about the trade behaviour of the different industries, and if the characteristics of an industry is inducing international trade. It is also interesting to find out more about which sectors the firms that only import belong to, and if this can help explain some of the properties of these firms.

First I will do a descriptive study of the sectors and trade types, and try to explain why some sectors trade more than others, and why they might have a high portion of only-import firms. I will focus on the sectors that stand out. Trade behaviour in each sector is described in section 4.2, and is an extension of the preceding section. Last I look at the number of trade partners in each sector, and see whether the number of trade partners is connected to average imports and average exports per firm.

[11] http://www3.ssb.no/stabas/ItemsFrames.asp?ID=5556001&Language=nb
[12] See Pavcnik et al (2004) for further evidence.

4.1 Industry affiliation

My description of the Norwegian industry in this section is mostly taken from the "Information Booklet about Norwegian Trade and Industry" by the Norwegian Ministry of Trade and Industry in 2005. Table 12 shows how many firms there are within each sector – given trade situation.

Table 12. Number of firms in each industry, by the type of trade and total number of firms. Sectors with less than 20 firms are gathered in the "others" group. NACE gives the sector codes for Norwegian companies.

		Type of trade				
NACE	Sector	No trade	Only export	Only import	Export& import	Total
24	Manufacture of chemicals and chemical products	8	1	26	94	129
28	Manuf. of fabricated metal, except machines	429	27	287	346	1089
36	Manuf of furniture	92	10	184	209	495
29	Manuf of machines and equipment	236	26	238	407	907
33	Manuf of medical, precision and optical instruments	86	2	64	105	257
34	Manuf of motor vehicles	7	3	29	59	98
26	Manuf of non-metal mineral products	86	6	137	102	331
31	Manuf of other electrical appliances	38	5	67	128	238
35	Manuf of other transportation equipment	165	16	136	216	533
32	Manuf of radios, TVs and other communication devices	4	1	10	51	66
25	Manuf of rubber and plastic products	24	8	62	152	246
17	Manuf of textiles	19	3	76	122	220
18	Manuf of wearing apparel	6		20	41	67
20	Manuf of wood, except furniture	226	30	220	196	672
15	Manuf of food and beverages	463	43	259	272	1037
27	Metal-production	15	1	22	51	89
14	Other mining	121	19	41	42	223
22	Publishing and printing	716	68	349	244	1377
21	Pulp, paper and cardboard production	6		13	53	72
70	Real estate activities	8	1	4	8	21
37	Recycling	22	5	17	31	75
19	Tanning and dressing of leather	2		6	13	21
51	Wholesale, except motor vehicles	1		2	18	21
	Others	23		16	25	64

Norway is one of the largest aluminium producers in the world, with a few, large producers (in resemblance with other metal manufacturing) in charge of most of the production[13]. This can be seen from table 12 where only 89 firms are listed as metal-producers. However, it is natural that an easy access to metals would make manufacture sectors using metal as intermediates more frequent, which is

[13] http://www.regjeringen.no/nb/dep/nhd/dok/veiledninger_brosjyrer/2001/Business-and-industry-in-Norway---The-metals-industry.html?id=419341

evident from this table where manufacture of machines and equipment and manufacture of fabricated metal are two of the largest groups firm-wise. Both these last groups have quite a large share of their firms only importing (about 26 %), especially compared to the share that only exports.

As with aluminium production: pulp, paper and cardboard production is a power-intensive industry. Norway is richly endowed with great energy resources, and has therefore become a significant contributor within this sector internationally. "Norske Skog" is one of the world's largest producers of magazine and newsprint paper, and in similarity with the metal-production industry, a few, large actors control the pulp, paper and cardboard industry. The publishing and printing industry on the other hand, has the highest number of firms reported in table 12. Norwegians are one of the most newspaper-reading people in the world, and the publishing and printing industry consists of a few large participants serving most of the market, and many small offering niche products. Here there is a larger share of firms only importing (25 %) than firms that both import and export (18 %), while more than 50 % of the firms are non-trading.

The last sector with more than 900 firms is the industry of food and beverage manufacturing. Most of the food in Norway gets processed before selling it to the consumers, and the food industry is therefore the second largest industry in Norway. By the EEA[14], Norway does not trade freely in food and beverages with other European countries and beverages are therefore among the things that are mainly produced domestically – giving a high density of breweries in Norway. 45 % of food and beverage-producing firms are only operating in Norway, while about 25 % are only involved in import and 26 % in both import and export. Norway has to import a lot of inputs to food production from abroad because farming here is mainly seasonal and of a limited range.

Other sectors worth noticing with regards to the number of firms that only import are: manufacture of furniture where 37 % are only importing and 42 % both importing and exporting; manufacture of non-metal mineral products

[14] http://www.regjeringen.no/nb/sub/europaportalen/eos-og efta/2008/dette_er_eosavtalen.html?id=516157

which has 41 % of the firms only importing and 31 % both importing and exporting; manufacture of other transportation equipment (which includes shipyards) has 25 % only importing and 41 % importing and exporting; and, manufacture of wood has 33 % only importing and 29 % doing both.

These sectors together employ most of the firms that only import. In part I firms that only import seemed to be located in sectors that had higher capital intensities, investments and value added per worker than other sectors (by comparing the summary statistics to the OLS regressions). Manufacture of fabricated metal, manufacture of machines, and manufacture of other transportation equipment are all involved in technological sectors, where Norway tries to compete internationally through their knowledge base and use of machines in production (like robots). The sector of furniture manufacture has also tried to find alternatives to manual labour in production. This means that the firms of these sectors are most likely quite capital intensive, with relatively few employees per product (which again produces a high value added per worker), and high investments to keep up with the capital depletion. Manufacture of wood and printing of paper also requires heavy machinery, and thus supports the assumption that most firms that only import are situated in capital intensive sectors.

Table 13. Summary statistics for average imports per firm in each sector, total imports in each sector, and the percentage of import value relative to total import value. The same goes for exports. All values are independent of whether they are only importing/only exporting. Average imports and exports, and total imports and exports are in 1000 NOK.

	Import			Export		
Sector	Average value per firm	Share of total value (%)	Total value per sector	Average value per firm	Share of total value (%)	Total value per sector
Manufacture of chemicals and chemical products	73519	13	9483976	180955	19	23343132
Manuf. of fabricated metal, except machines	2513	4	2736774	2288	2	2491679
Manuf of furniture	4342	3	2149246	3891	2	1926089
Manuf of machines and equipment	5520	7	5006903	11526	9	10453984
Manuf of medical, precision and optical instruments	9931	3	2552330	18185	4	4673506
Manuf of motor vehicles	15180	2	1487683	42403	3	4155493
Manuf of non-metal mineral products	6925	3	2292089	4050	1	1340459
Manuf of other electrical appliances	10858	3	2584252	12122	2	2885019
Manuf of other transportation equipment	8781	6	4680219	10561	5	5628950
Manuf of radios, TVs and other communication devices	16880	1	1114060	47469	3	3132981
Manuf of rubber and plastic products	7890	3	1940856	7115	1	1750312
Manuf of textiles	4847	1	1066319	4418	1	971886
Manuf of wearing apparel	6083	1	407533	3378	0	226324
Manuf of wood, except furniture	4070	4	2735165	3041	2	2043814
Manuf of food and beverages	11448	16	11871747	8551	7	8867755
Metal-production	182982	22	16285439	371627	27	33074784
Other mining	651	0	145237	4727	1	1054217
Publishing and printing	1032	2	1421555	213	0	293263
Pulp, paper and cardboard production	46910	4	3377553	140991	8	10151377
Real estate activities	9173	0	192625	9428	0	197979
Recycling	1134	0	85019	5513	0	413438
Tanning and dressing of leather	6540	0	137348	8833	0	185489
Wholesale, except motor vehicles	40976	1	860487	113175	2	2376680
Others	17556	0	51337	9858	0	71997

Table 13 presents the average values of imports and exports per firm in the different sectors, share of import or export value by total import or export value, and import and export values in each sector. By looking at the sectors discussed above, they are no longer the industries that stand out trade-wise. This means that the industries one sees most frequently in the domestic market, does not necessarily perform best in trade values. This being said, the primary industries mentioned as a result of the natural resource composition in Norway are represented when it comes to monetary performance in the international market: metal-production, and pulp, paper and cardboard production have the highest average import value per firm along with chemicals production. Average export values are also highest in these firms.

In percentage of trade values, the sector of metal-production has 22 % of total import values in the Norwegian industry. This is also the sector with the largest exports, with 27 % of total exports in the Norwegian industry as a whole. Manufacture of food and beverages imports 16 % of total import values, but export only 7 %. Manufacture of chemicals is also contributing a great deal in import values, with 13 % of total imports. Percentage of total exports values is also high at 19 %. Together these three sectors contribute with more than 50 % of imports and exports in the Norwegian industry. The pulp, paper and cardboard sector is a bit smaller in percentage values of totals than the mentioned sectors.

As much as 90 % of the aluminium production is exported (given by the "Information Booklet about Norwegian Trade and Industry"), thus it is not surprising that metal-producers have among the highest average exports in Norway. The high average imports are most likely due to the need for aluminium oxide or bauxite to be able to produce aluminium[15] – which Norway does not possess and must therefore import. As mentioned firms in pulp, paper and cardboard report quite high average values in imports and exports, and have about a third of their export value in average imports, which means that also this industry is importing a great share of their intermediates from abroad.

Manufacture of chemicals consist of fertilizer production, where "Norsk Hydro"[16] (today "Yara") led the way a century ago with producing a cheap fertilizer thanks to easy energy-access. Metal-production, pulp, paper and cardboard production, and production of chemicals are all power-intensive industries. Norway has relatively easy access to energy, and it thus seems that the greatest exporters in the Norwegian industry are the ones using intensively in production the endowments Norway is abundantly endowed with – in accordance with the Heckscher-Ohlin theorem[17].

Wholesale is also large in average import and export values per firm, followed by manufacture of radios, TVs and other communication devices, and manufacture

[15] http://www.snl.no/aluminium
[16] http://www.hydro.com/en/About-Hydro/Our-history
[17] Feenstra (2004)

of motor vehicles. All have far higher values in average exports per firm than average imports, but very low contributions to total import values as a whole (2% and less).

Manufacture of food and beverages has been mentioned before because of the many firms occupied in this sector. In table 13 this sector stands out because of its relatively high average imports per firm and high contributions to total imports with 16 %, and - in contrast to the typical sectors – a low value in average exports per firm. Most of the food in Norway gets processed before being sold in the supermarkets, and Norway's climatic restrictions to all-year farming might be one of the reasons why the inputs to production are imported from abroad for domestic consumption.

4.2 Industry affiliation and trade partners

Next is looking at the number of trade partners within each sector. The domestic market is counted in as a trade partner, so the firms displaying one trade partner (or country) are trading only domestically. Table 14 shows the percentage of firms involved with different levels of trade intensities (or trade partners) - independent of trade type.

Table 14. Summary statistics of the percentage of firms within a sector having 1 trade partner (only domestic), 2 trade partners, 3-5 trade partners, 6-10, 11-50, or 51-100.

	Trade partners					
Sector	1	2	3-5	6-10	11-50	51-100
Manufacture of chemicals and chemical products	6.20	4.65	21.7	15.5	43.4	8.53
Manuf. of fabricated metal, except machines	39.3	16.5	22.0	13.7	8.27	0.28
Manuf of furniture	18.4	14.2	26.1	22.7	18.6	0.00
Manuf of machines and equipment	26.0	12.9	23.7	15.4	21.1	0.88
Manuf of medical, precision and optical instruments	33.5	10.5	14.4	16.3	23.0	2.33
Manuf of motor vehicles	7.14	14.3	30.6	25.5	22.5	0.00
Manuf of non-metal mineral products	25.8	21.2	27.9	12.4	12.1	0.61
Manuf of other electrical appliances	15.6	7.59	25.3	23.1	25.7	2.53
Manuf of other transportation equipment	30.6	15.6	21.5	16.6	15.1	0.38
Manuf of radios, TVs and other communication devices	6.06	7.58	13.6	12.1	54.6	6.06
Manuf of rubber and plastic products	9.76	9.35	28.1	26.0	26.9	0.00
Manuf of textiles	8.64	11.8	24.6	25.0	30.0	0.45
Manuf of wearing apparel	8.96	4.48	22.4	22.4	41.8	0.00
Manuf of wood, except furniture	33.5	23.5	27.0	11.0	4.92	0.00
Manuf of food and beverages	44.5	13.7	17.0	11.7	12.9	0.19
Metal-production	17.1	4.55	28.4	14.8	35.2	0.00
Other mining	54.3	17.9	18.4	8.07	1.35	0.00
Publishing and printing	52.0	17.0	18.1	8.58	4.36	0.00
Pulp, paper and cardboard production	8.33	6.94	9.72	30.6	43.1	1.39
Real estate activities	38.1	14.3	9.52	23.8	14.3	0.00
Recycling	29.3	24.0	16.0	26.7	4.00	0.00
Tanning and dressing of leather	9.52	4.76	23.8	28.6	33.3	0.00
Wholesale, except motor vehicles	4.76	0.00	19.1	28.6	38.1	9.52
Others	33.9	14.5	21.0	16.1	14.5	0.00
Total	33.5	15.1	21.7	14.7	14.5	0.58

First: from looking at table 14 it is evident that most firms trade with less than fifty markets – no matter which sector they are in. The wholesale sector has the highest percentage of firms trading with more than fifty markets, with about 9.5 % of their firms. Sectors having 40 % or more of their firms trading with 11 or more countries are: manufacture of wearing apparel; pulp, paper and cardboard production; manufacture of chemicals and chemical products; wholesale except motor vehicles; and, manufacture of radios, TVs and other communication devices. These sectors were also mentioned in regards to their high average

values of trade per firm (in table 13) – except the sector of wearing apparel. A connection between the number of trade partners and high average trade values is natural if each firm trades the same values to and from each destination.

Metal-production has 35 % of its firms trading with more than ten markets, and only 17 % of the firms trading solely domestic. Manufacture of fabricated metal has 30 % of their firms trading with more than five markets, while manufacture of machines and equipment has almost 43 % of their firms trading with more than five markets. The sector of motor vehicle production has almost half of their firms trading with more than five markets, and only 15 % of their firms operating only within the Norwegian borders.

All in all, the firms that have high average values of international trade per firm seem to have a high share of their firms trading with more than five markets. Table 15 below is a correlation matrix to see if there is in fact a correlation between the number of trade partners and average imports and exports for each sector.

Table 15. Correlation matrix for the number of trade partners, average import value per firm in a given sector, and average export value per firm in a given sector. These calculations consider all firms in all sectors.

	Trade partners	Av.export	Av.import
Trade partners	1.000		
Average export	0.202	1.000	
Average import	0.177	0.927	1.000

Table 15 shows the correlation between the number of trade partners, and average export and average imports in each sector. The correlation coefficient (or Pearson's coefficient) between the number of trade partners and average exports per firm in a sector is 0.20, which means there is a positive relationship between the number of trade partners per firm and average exports (average exports increase with 0.20 when the firm gets one more trade partner). The relationship is a bit weaker between trade partners and average imports, with a

coefficient of only 0.18. Still, there seems to be a positive trend between the number of trade partners, and average imports and exports in each sector.

Table 15 also shows that average imports and average exports in each sector are highly correlated with a correlation coefficient of 0.9268. This means that if average imports increase by one, average exports will increase by 0.93.

Table 14 also shows the total percentage of firms (bottom row) in the Norwegian industry that are only trading in Norway, trading with two markets, 3-5 markets, 6-10 markets, 11-50 markets, and 51-100 markets. Percentage participation in each group, respectively: 33.5 %, 15.1 %, 21.7 %, 14.7 %, 14.5 %, and 0.58 %. Eaton, Kortum and Kramarz (2004)[18] have written an article about international trade and export destinations for French firms, where their conclusion is that most firms sell to the domestic market only. For the Norwegian industry, 1/3 of all firms are just trading domestically, and more than 1/3 are trading with 2-5 markets – hence: firms in the Norwegian industry are very often only trading in Norway, and mostly trading with five markets or less. This reflects a similarity between the Norwegian and French industry when it comes to trade partner intensity per firm.

[18] Eaton, Kortum and Kramarz (2004)

4.3 Industry affiliation, trade situation, and trade partners

Table 16. Summary statistics. Average number of trade partners per firm in each sector for firms that only import and firms that both import and export.

		Average trade partners per firm	
NACE	Sector	Only import	Export& import
24	Manufacture of chemicals and chemical products	3.5	22.8
28	Manuf. of fabricated metal, except machines	2.2	8.20
36	Manuf of furniture	3.2	10.3
29	Manuf of machines and equipment	2.6	12.6
33	Manuf of medical, precision and optical instruments	3.3	17.9
34	Manuf of motor vehicles	2.6	10.2
26	Manuf of non-metal mineral products	2.5	10.4
31	Manuf of other electrical appliances	3.0	14.8
35	Manuf of other transportation equipment	2.1	10.0
32	Manuf of radios, TVs and other communication device	2.1	24.7
25	Manuf of rubber and plastic products	3.4	10.1
17	Manuf of textiles	3.8	12.1
18	Manuf of wearing apparel	5.0	12.0
20	Manuf of wood, except furniture	2.1	5.80
15	Manuf of food and beverages	2.8	11.4
27	Metal-production	3.2	16.2
14	Other mining	1.7	5.30
22	Publishing and printing	2.3	6.40
21	Pulp, paper and cardboard production	3.9	15.8
37	Recycling	1.9	5.90
51	Wholesale, except motor vehicles	4.0	15.7
	Others	2.5	10.2
	Total	2.6	11.1

Table 16 displays the average number of markets each firm in the different sectors trade with – dependent of whether they are only importing or both importing and exporting. The domestic market is not included as a trade partner since Norwegian firms will not import or export to Norway. Firms that only export are excluded because there are rather few of them in each sector (seen from table 12). The sectors described below are mainly the ones described already.

In manufacture of chemicals the firms that only import on average trade with 3.5 countries outside Norway (which is high compared to the average total of 2.6 in

the last row). Average trade intensity for firms that both import and export is twice the size of the average total with 22.8 foreign markets per firm. This sector was one of the sectors with the highest average import and export values per firm (see table 13).

Manufacture of metal actually displays a lower average number of trade partners than the total average for all industries. Here the average trade values were also relatively low (as seen in table 13), and from looking at these first two sectors, the positive correlation between average exports, average imports, and the number of trade partners seems plausible.

Manufacture of machines and equipment had quite mediocre average imports and exports, and the same is seen here in table 16: the number of trade partners for firms that only import and firms that only export are about the same as the average total values in the last row. The average trade partners for the sector of motor vehicle manufacture is on the other hand quite surprising. This sector was among the highest with regards to average import and export values, but here they display the same values as the average total, and even a bit lower than the average total for firms that both export and import. This could mean that this sector trades with rather few countries, but that each country import/export high values of merchandise. Part III will look more at the details of trade with countries in a few selected sectors, manufacture of motor vehicles being one of them.

Manufacture of radios, TVs and other communication devices has only 2.1 trade partners on average for firms that only import, but the highest number of trade partners of all for firms that both import and export with 24.7. This sector has more than 75 % of its firms involved in both kinds of trade, and only a handful of firms just importing (from table 12), which could be why these values are so far apart. Manufacture of radios and other communication devices also had high values of average imports and exports.

Metal-production shows some of the same tendency – only to a smaller extent. Both for firms that only import and for firms that export and import the number of trade partners is above the average trend. This supports the assumption of

correlation between average imports, average exports, and the number of trade partners.

All sectors in table 16 have lower average trade intensities for firms that only import than firms that both import and export. This is coherent with the summary tables above, and table 16 clarifies the actual differences in trade intensities, and shows that even though firms that only import are large in the number of firms (from table 1), the degree of trade intensity is smaller than for firms that both import and export.

5 Part III: Trade partners and destinations

The subject of trade partners and how trade intensities affect the productivity, domestic sales, and other variables has been formalized by Eaton, Kortum and Kramarz in their articles "An anatomy of International Trade: Evidence from French Firms" from 2008, and "Dissecting Trade: Firms, Industries, and Export Destinations" from 2004. These articles are only on export behaviour, and I will use many of the same methods on import behaviour to see how firms that import differ from export firms.

In the first two sections I will analyze the general implications of having a certain number of trade partners in firms that import and firms that export. Section 5.1 gives an overall picture of the relationship between the number of firms engaged with countries in trade, both in imports and in exports. This is similar to the work done by Eaton et al (2004).

The preceding section tries to explain the relationship between import/export partners and investments, capital costs, hours worked, value added, and revenues. This is an elaboration to the analysis I did in part I, and by using OLS regression I can better analyze the relationship between trade intensities and the given variables. Next I take the methods in Eaton et al (2004) further, and see how import, export, and total trade values relate to the number of trade partners.

In section 5.3 I bring use of the methods in Eaton et al (2007), and find the relationships between import and export values and the number of firms selling to a given destination. I will also give a picture of how domestic sales relates to the number of firms importing/exporting to a destination. As already mentioned, Eaton et al (2007) only analyze exports, while I will compare the export behaviour to import behaviour.

Throughout the last section I will focus on a handful of sectors that stood out in firm participation and trade values. I wish to look closer into these sectors, and see which countries they actually trade with, the amount of trade in each sector, and whether they import and export from different countries.

5.1 Trade partners in the Norwegian industry

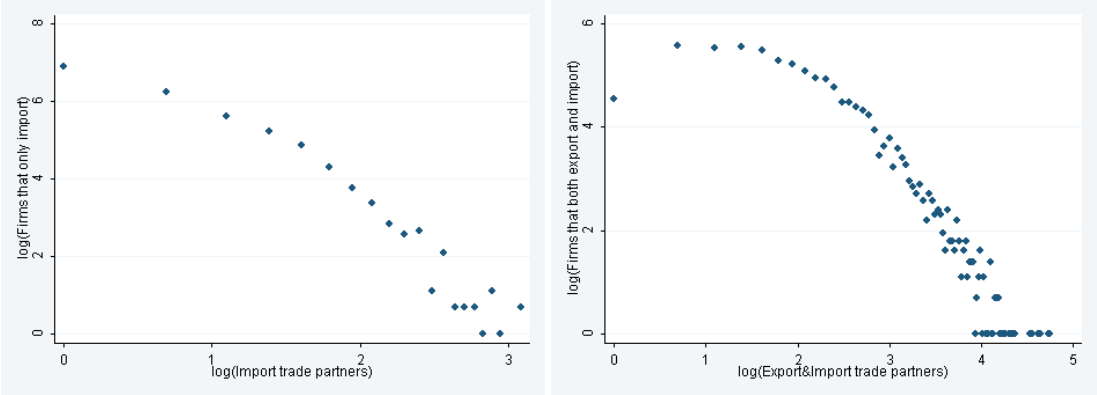

Figure 1 and 2. How the number of trade partners (in logarithmic scale) affects the number of firms (in logarithmic scale) involved in given levels of trade partners. Firms that only import on the left and firms that both import and export on the right.

As already mentioned these figures are similar to those of Eaton et al (2004), only here the behaviour of firms that only import is included. These figures are meant to clarify the relationship between the number of firms and the number of trade partners. This has been touched on several times above; most firms seem to be involved with only a handful of trade partners, and only a few are trading with more than ten countries. It is therefore interesting to see whether this decline in trade partner participation is a smooth one, or rather volatile.

Figure 1 and 2 shows the percentage change in the number of firms that trade with a given number of countries, as the number of countries increases. The domestic market is not included, since firms that only import or both import and export will not be trading only with Norway. From figure 1 it is easily seen that the number of firms that only import decreases with the number of trade partners (or trade intensity) – and that the slope follows a smooth path. This means that the percentage change in the number of firms "falling of the wagon" as the number of trade partners increases by one, is more or less the same for all 1%-changes in trade partners. The same is shown for firms that both import and export, only here the value for one trade partner is far lower than the preceding. This means that from one to two trade partners the percentage increase in firm participation is actually positive. This is also shown in table 8, where the number

of firms (that both export and import) having one trade partner is 94, and two trade partners is 261.

To find out the elasticities, or percentage change in the number of firms as the number of trade partners increases by 1 %, an OLS regressions may be performed. The regression equations are of the form:

$$\log(\text{only import firms}) = \chi_0 + \chi_{\text{imp-prtn}} * \log(\text{import partners}) + \varepsilon_2 \quad (2)$$

$$\log(\text{both imp\&exp firms}) = \rho_0 + \rho_{\text{trdprtn}} * \log(\text{im\&exp partners}) + \varepsilon_3 \quad (3)$$

χ_0 and ρ_0 are the intercept-coefficients, $\chi_{\text{imp-prtn}}$ and ρ_{trdprtn} are the coefficients for the change in the number of firms when the number of trade partners increases by 1 %, and ε_2 and ε_3 are random error terms.

Table 17. Coefficients show percentage change in the number of firms as the number of trade partners increases by 1%.

	Number of firms (dep.var)	
Indep.variable	Only import	Export& import
Import partners	-1.51	
	(0.00)	
Export&import partners		-0.966
		(0.00)
N	2285	2985
R^2	0.924	0.661

Both independent and dependent variables are in logarthmic scale. P-values are shown in parentheses.

Both the coefficients turn out significant and negative, which supports the statement that the number of firms (per interval of trade partners) decreases with the number of trade partners. The coefficient of import partners is more

negative than the coefficient of import and export trade partners, so this regression states that for firms that only import the effect of an increase in trade partners is larger with regards to firm-participation than in the case for firms that both import and export. In other words: firms that both import and export have a less steep curve than firms that only export. From looking at the figures it looks more like the opposite, and the difference in coefficients has probably more to do with the phenomenon where firms that both import and export are increasing in percentage from one to two trade partners, and that this has a positive effect on the coefficient for firms that both import and export.

The value of R^2 also reflects that the number of firms involved with a given number of trade partners is less affected by an increase in trade partners in the case of firms that both import and export, than in the case of firms that only import. Almost all (or 92.4 %) of the variation in the number of only-import firms involved with a trade partner is given by the changes in trade partners. This means that if the number of trade partners goes up or down, the number of firms involved will change in a according to the changes in trade partners. This is not as evident for firms that both import and export, which is shown through the lower R^2 of 66.1 %.

5.2 Trade partners and firm behaviour

Another point of interest is whether the number of trade partners affects variables similar to those in part I: wage per worker, capital costs per worker, value added per worker, investments per worker, and revenues. This can also be measured through an OLS regression, with similar equations as in (2) and (3):

$$\log(X) = \beta_{0x} + \beta_{1x}*\log(\text{import partners}) + \varepsilon_x \qquad (4)$$

where: X = {wage per worker, value added per worker, capital costs per worker, revenues per firm, investments per worker}

$$\log(X) = \beta_{0x} + \beta_{1x}*\log(\text{im\&exp partners}) + \varepsilon_x \qquad (5)$$

where: X = {wage per worker, value added per worker, capital costs per worker, revenues per firm, investments per worker}

Table 18. Effect of trade intensity on wage per worker, value added per worker, capital costs per worker, revenues per firm, and investments per worker for firms that only import (equation (4)).

	Dependent variables				
Variable for trade partners	Wage per worker	Value added per worker	Capital costs per worker	Revenues per firm	Investments per worker
Import partners	0.037	0.055	0.114	0.282	0.033
	(0.02)	(0.00)	(0.00)	(0.00)	(0.53)
N	2269	2243	2270	2279	1591
R^2	0.002	0.004	0.007	0.027	0.000

Dependent variables and variable for import partners are in logarithmic scale. P-values are in parentheses.

Table 18 shows the result of the OLS regressions for firms that only import. All variables are in logarithmic scale. The regressions show that in firms that only import, the number of trade partners has a positive effect on wage per worker, value added per worker, capital costs per worker, and total revenues. The coefficient for investments per worker is only significant at a 53 %-level (given the p-value), and will not be considered because of the high probability of it actually being zero. Trade intensity will have the largest effect on revenues, where revenues increase by 0.28 % when the number of trade partners increases by 1 %. Wage per worker is significant at a 2 %-level, and has a very small coefficient of 0.037 %. The change in value added per worker is also quite small when the number of trade partners changes, with only 0.055 %. The coefficient for capital costs per worker is a bit larger with 0.114 %.

The R^2 values of the regressions are reflecting the values of the coefficients, where the number of trade partners help explain less than 1 % of the variation in wage per worker, value added per worker, and capital costs per worker. Again there are other factors not considered here that affect the changes in these variables. The R^2 value of revenues per firm is a bit higher at 2.7 %, but the

number of import partners is still a poor tool to alone determine why and how revenues fluctuate.

All the regressions in table 18 have more or less the same number of observations, except in the case of investments per worker where again; many firms report a null-value for investments in 2004 because of misreporting or actual lack of investments the concerning year.

Table 19. Effect of trade intensity on wage per worker, value added per worker, capital costs per worker, revenues per firm, and investments per worker for firms that both export and import (equation (5)).

	Dependent variables				
Variable for trade partners	Wage per worker	Value added per worker	Capital costs per worker	Revenues per firm	Investments per worker
Import&export partners	0.128 (0.00)	0.111 (0.00)	0.057 (0.00)	1.032 (0.00)	-0.052 (0.12)
N	2974	2935	2975	2985	2317
R^2	0.062	0.030	0.003	0.335	0.001

Dependent variables and variable for import&export partners are in logarithmic scale. P-values are in parentheses.

Table 19 gives a similar analysis as in table 18, only here it is for firms that both import and export. The coefficient for investments per worker is still dismissed as significant, as the p-value is not even within the 10 % significance level. The other coefficients have p-values of less than 1 %, and are therefore considered sufficiently significant to be evaluated.

Revenues per firm is the variable most affected by changes in trade partners for firms that both import and export, where the value of revenues per firm changes by 1.032 % as the number of trade partners increases by 1 %. The R^2 value is also far higher than for the other variables, with 33.5 % of the variation in revenues per firm being explained by changes in the number of trade partners. The coefficient for wage per worker is not too bad either; wage per worker changes by 0.128 % as the number of trade partners changes by 1 %. R^2 is also far higher than for firms that only import, with 6.2 %. Value added per worker is also quite high at 0.111 %, though the R^2 is still a bit weak at 3 %. Capital costs

per worker has a low coefficient of 0.057 %, in addition to an R^2 lower than 1 %. Again there is some misreporting or lack of investments which lead to fewer observations in the regression for investment per worker.

By comparing firms that only import to firms that both import and export, the latter seems more affected by trade intensities. Especially in the case of revenues per firm, it seemed like firms that both import and export were quite affected by the number of trade partners. But the main conclusion from doing these regression is that firms that only import is affected by far more things than the number of trade partners when it comes to wage per worker, value added per worker, capital costs per worker, revenues per firm, and investments per worker – even though the effect of more trade partners was positive on all significant variables. For firms that both import and export the effect of trade intensities was stronger, except in the case of capital costs per worker.

If it is the case that large firms (with many employees) have more trade partners, some of the positive effects from the regressions in table 18 and 19 might stem from the size of the firms – rather than the number of trade partners. Since we have seen that certain sectors have more trade partners (table 14), the positive coefficients in the regressions in table 18 and 19 may also come from which sector they belong to. This can be mended for in a new OLS regression, in the same manner as the regressions in table 6 and 7, where the number of workers is used as a proxy for firm size and a sector-dummy represents the NACE-codes for the various sectors. The regression equation for firms that only import:

$$\log(X) = \beta_{0x} + \beta_{1x^*} \log(\text{import partners}) + \beta_{2x^*}\log(\text{workers}) + \beta_{3x^*}\text{sector} + \varepsilon_x \quad (6)$$

where: X = {wage per worker, value added per worker, capital costs per worker, revenues per firm, investments per worker}

And the regression equation for firms that both import and export:

$$\log(X) = \beta_{0x} + \beta_{1x^*} \log(\text{imp\&exp partners}) + \beta_{2x^*}\log(\text{workers}) + \beta_{3x^*}\text{sector} + \varepsilon_x \quad (7)$$

where: X = {wage per worker, value added per worker, capital costs per worker, revenues per firm, investments per worker}

Table 20. Effect of trade intensity on wage per worker, value added per worker, capital costs per worker, revenues per firm, and investments per worker for firms that only import (equation (6)). Size and industry are kept constant.

	Dependent variables				
Variable for trade partners	Wage per worker	Value added per worker	Capital costs per worker	Revenues per firm	Investments per worker
Import partners	0.023	0.058	0.149	0.126	0.101
	(0.17)	(0.00)	(0.00)	(0.00)	(0.05)
N	2269	2243	2268	2274	1589
R^2	0.024	0.006	0.065	0.684	0.090

Dependent variables and variable for import partners are in logarithmic scale. P-values are in parentheses.

Table 21. Effect of trade intensity on wage per worker, value added per worker, capital costs per worker, revenues per firm, and investments per worker for firms that both export and import (equation (7)). Size and industry are kept constant

	Dependent variables				
Variable for trade partners	Wage per worker	Value added per worker	Capital costs per worker	Revenues per firm	Investments per worker
Import&export	0.084	0.111	0.062	0.223	-0.044
partners	(0.00)	(0.00)	(0.01)	(0.00)	(0.26)
N	2974	2935	2975	2979	2317
R^2	0.088	0.032	0.032	0.820	0.025

Dependent variables and variable for import&export partners are in logarithmic scale. P-values are in parentheses.

In the regressions of table 20 and 21 the firm size and industry are kept constant. The number of trade partners still have a positive effect on wage per worker, value added per worker, capital costs per worker, and revenues per firm. For firms that import, the coefficient for wage per worker is no longer significant at a 1%-level (the p-value is as high as 17 %), but as is seen from table 20; the

coefficient below investments per worker is now positive and significant at a 5 %-level.

In table 20 and 21 value added has remained more or less the same, while the coefficient of wage per worker has decreased. The coefficients of capital costs per worker have actually increased, while revenues per firm have decreased substantially. The values for R^2 have increased, which is natural when including more independent variables (sector and size) in the regressions. By the assumption that some of the "trade partner-effects" might come from the correlation between size of firms and the number of trade partners (and also the sectors they belong to); it seems to play a role for firm revenues. The differences are less substantial for the other variables, and the coefficients that are significant at a 1 %-level remain positive. The conclusion from these regressions is therefore that the number of trade partners seem to have a positive effect on wage per worker (at least for firms that both import and export), value added per worker, capital costs per worker, and revenues per firm – even when size and industry are accounted for. Next section looks at the relationship between trade intensities and trade values.

5.2.1 Trade partners, export values, and import values

After looking at the firm participation at given levels of trade partners, it is interesting to see how the average values of import for firms with one trade partner, average values of import for firms with two trade partners, average values of import for firms with three trade partners, etc. vary with their given number of trade partners. One would assume that total import value per firm will increase as the number of trade partners for this firm increases, and in the same manner as with figure 1 and 2 a proper figure will reveal weather this increase follows a smooth slope or a highly fluctuating one. The same calculations will be made for firms that export. In this section firms are divided into those that import and those that export – disregarding whether they are only importing, only exporting, or doing both.

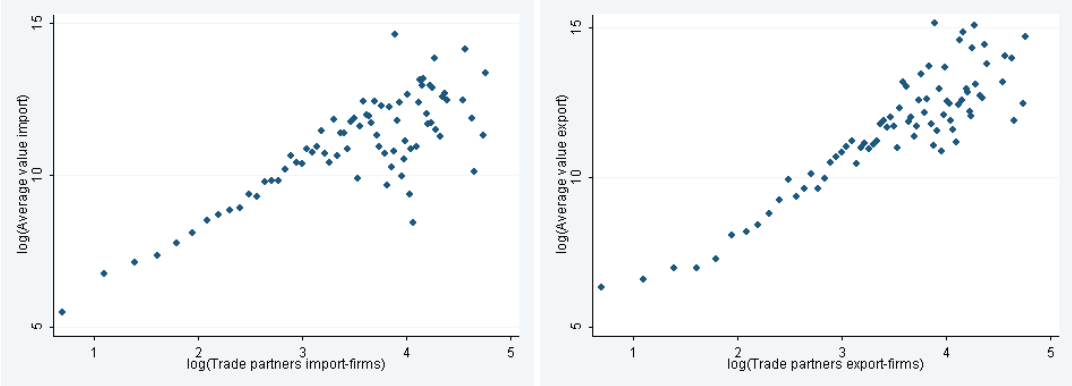

Figure 3 and 4. Average trade value per firm at given numbers of trade partners. Both the average trade value and the number of trade partners are in logarithmic scale. Left figure shows firms that import (firms that only import and firms that both export and import), while right shows firms that export (firms that only export and firms that both export and import).

Both figure 3 and 4 display a similar upward slope, even though the observations of figure 4 are less spread than figure 3 in the higher values of trade partners. This means that average values of imports per firm are more volatile with high numbers of trade partners than average values of exports per firm – although the results are fairly similar and one can assume similarities in the relationships of trade partners and trade values between exports and imports. The change in average trade values thus increase by a more or less constant percentage as the number of trade partners increases, which in layman's terms means that the average trade values per firm increase with trade intensity.

5.3 Countries the Norwegian industry trades with

This section looks at which countries the firms actually trade with. The translations of the ISO-codes are downloaded from the web-pages of Statistics Norway[19]. In Eaton et al (2007) they analyze how the number of French firms selling to a market affect variables such as domestic sales and sales to a market – all given export destinations and export values. Similar procedures will be made here with firms that export and firms that import. Table 21 gives the number of firms that trades with each destination – independent of whether it is imports, exports, or both. To shorten the list only the countries that have more than 250 Norwegian firms trading with them are included.

[19] www.ssb.no/emner/09/05/land_no.html

Table 22. Summary statistics of the number of firms trading with each country. Only the countries with more than 250 firms are included.

ISO-codes	Trade partners	Firms
AT	Austria	732
AU	Australia	335
BE	Belgium	1066
CA	Canada	543
CH	Switzerland	907
CN	China	898
CZ	Czech Republic	461
DE	Germany	2862
DK	Denmark	3451
EE	Estonia	408
ES	Spain	943
FI	Finland	1575
FR	France	1274
GB	Great Britain	2167
HK	Hong Kong	425
IE	Ireland	411
IN	India	365
IS	Iceland	558
IT	Italy	1531
JP	Japan	714
KR	Republic of Korea	386
LT	Lithuania	375
NL	Netherlands	1711
NO	Norway	8348
PL	Poland	809
PT	Portugal	371
RU	Russia	309
SG	Singapore	372
TW	Taiwan	493
US	USA	1639

The top foreign trade partner of the Norwegian industry is Sweden with 4076 Norwegian firms trading with it. This might not come as a surprise considering the proximity and close relations Norway has to the neighbouring country. Denmark comes second with 3451 firms as trade partners, Germany third with 2862, and Great Britain fourth counting 2167 firms. The Netherlands (1711), the United States (1639), Finland (1575), Italy (1531), France (1274), and Belgium

(1066) are also countries having more than thousand Norwegian firms trading with them.

European countries are heavily represented in this list, which is not a revelation considering the trade agreement between Norway and the European countries[20], where the European Economic Area claims that services, capital, goods, and people can move freely (except for the clause on food and beverages mentioned in part II).

5.3.1 Export and import values to and from countries

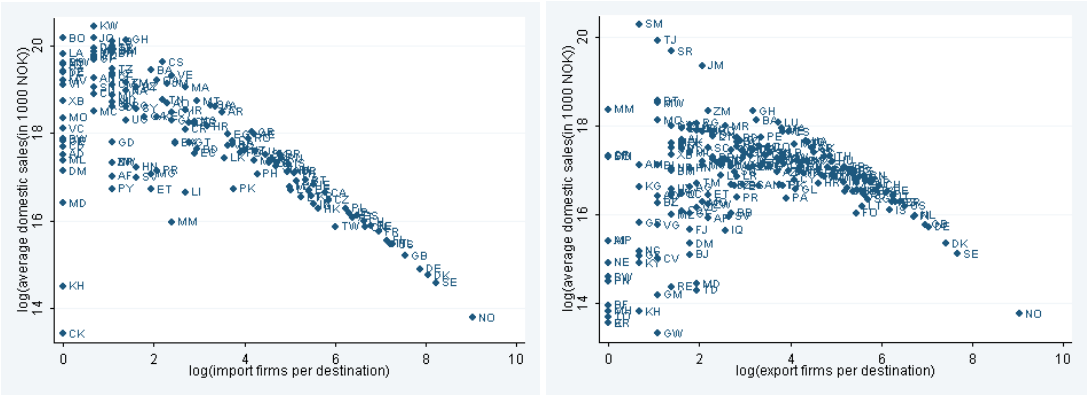

Figure 5 and 6. Value of trade per destination on the y-axis, and the number of firms that trade with each destination on the x-axis. Import on the left side and export on the right.

These figures are similar to figure 3 and 4, only now it is the value of trade per destination by the number of firms trading with each destination, in stead of the average trade values per firm by the number of firms in each interval of trade partners. Figure 5 and 6 are made to see if trade values per country increase as more firms trade with a given country. One would assume that this is the case, especially if each firm export or import about the same values to each country. These figures further highlight if this increase is constant – as in the case of figure 1-4. As in figure 3 and 4 there is no separation of firms that only import and both import and export, or only export and both import and export.

Figure 5 gives the total value of imports from a given origin (or country), and the number of firms that import from this country. Figure 6 is the same, only for

[20] http://www.regjeringen.no/nb/dep/nhd/tema/eos-det-indre-marked.html?id=517420

export values and export firms. As in figure 3 and 4; figure 5 and 6 display similar trends, but figure 5 (import) have slightly more spread observations. The conclusion is still that firms that import express a positive relationship between the values of imports from a country, and the number of Norwegian firms importing from this country. The same goes for the number of firms that export to a destination, and the total export values delivered here. The attributes of firms that import thus seem very similar to the attributes of firms that export.

Further it would be interesting to find out more about the average imports and exports to each country, and relate this to the number of firms that are trading with each country (given in table 22). Table 23 displays the average values of trade with the different countries, and provides a clearer image of actual values than the preceding figures that were presented first of all to illustrate trend and the relationship between trade values and the number of firms in each destination.

Table 23. Summary statistics of total value of exports to a destination, total value of imports from a destination, and total value of trade (imports + exports) with a destination. All values are in 1000 NOK, and only the countries with more than 250 Norwegian firms trading with them are included.

Trade partners	Export value (in 1000 NOK)	Import value (in 1000 NOK)	Total trade value (in 1000 NOK)
Austria	1006403	651904	1658307
Australia	683759	117301	801061
Belgium	3318316	1835593	5153909
Canada	793456	452898	1246354
Switzerland	1229699	793206	2022905
China	2612289	1216718	3829007
Czech Republic	421423	681747	1103170
Germany	18232874	7807821	26040696
Denmark	6495165	5339823	11834987
Estonia	253639	530754	784393
Spain	4265558	933426	5198984
Finland	3917192	2905800	6822992
France	6182347	2581400	8763746
Great Britain	13032469	5333477	18365946
Hong Kong	450927	188493	639420
Ireland	2799489	1334120	4133609
India	413477	229681	642858
Iceland	479459	484577	964036
Italy	4622281	1945576	6567857
Japan	2824646	531442	3356089
Republic of Korea	1558882	169145	1728027
Lithuania	316534	527961	844494
Netherlands	5268244	4301140	9569384
Norway	1983236	2015986	3999222
Poland	1975754	153392	2129146
Portugal	1046816	5854422	6901238
Russia	15479324	13176716	28656040
Singapore	1212980	305310	1518290
Taiwan	486477	157561	644038
USA	7285681	3587707	10873388

In table 23, Germany has more than 18 billion NOK in export-value from Norway, and Norway imports more than 8 billion NOK worth of merchandise from Germany. Denmark, on the other hand, only receives industrial merchandise from Norway worth 6.5 billion NOK, and sells merchandise to the Norwegian

industry worth a bit more than 5 billions. This is far less than the value of trade between the Norwegian industry and Germany, especially on the export-side.

Great Britain is also very large in trade value compared to the number of firms trading there: 13 billion NOK in export-value and more than 5 billion NOK in imports. The US actually outruns Denmark on export-value as well, with more than 7.3 billions in exports and 3.6 billions in imports. Sweden buys fewer goods from the Norwegian industry (at least of lower value) than Germany. Sweden reports an export value of 15.5 billion NOK, which is certainly lower than the 18.2 billion NOK to Germany. In imports, however, Sweden is the country Norway trades most with: 13.2 billion NOK in total import value.

So even though figure 5 and 6 showed a positive relationship between the number of firms trading with a country and the import and export values, there are some exceptions – which is why the relationship is referred to as a trend, and not an absolute connection. The figures below display the *trend* relationships between average domestic sales and trade values per destination.

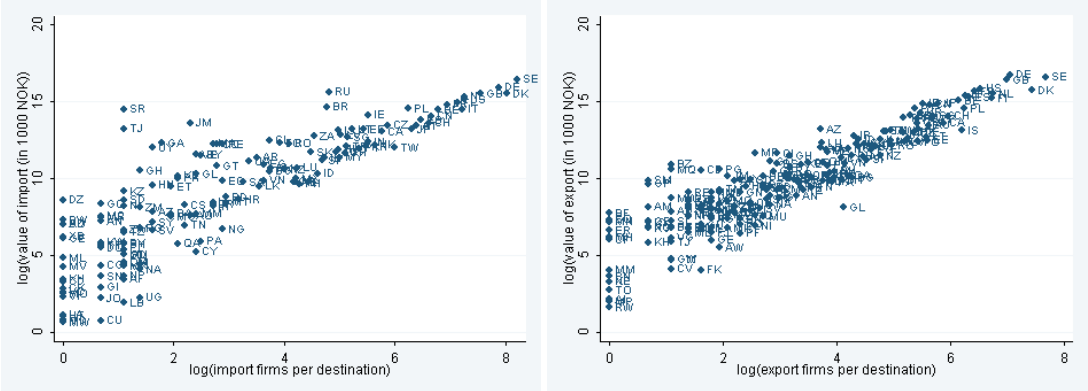

Figure 7 and 8. Average domestic sales per firm trading with a given destination by the number of firms trading with this destination. Imports left and exports right.

Figure 7 shows the average domestic sales per firm importing from a given country by the *number* of firms importing from this country. Figure 8 is the same, only in exports. Comparing these two figures the firms that import actually express a more visible downward sloping trend than firms that export. This negative trend implies that the more firms that trade with a given destination,

the lower are the average domestic sales (or sales in Norway) per firm. This can be translated into: the less popular a destination is to trade with, the higher the domestic sales have to be in order for a firm to be willing to trade with this unpopular country. This is more evident for imports than exports, which might mean that a firm demands lower domestic profitability in order to start exporting to an unpopular country, than what it does to start importing from an unpopular country.

These two figures also show Norway's positioning with regards to average domestic sales per firm trading with Norway, and the number of trade partners. The dot for NO is completely on trend, and domestic sales per firm in Norway and the number of firms operating there is therefore representative for the other countries Norwegian firms trade with.

5.3.2 Sectors and trade destinations

This section examines which countries a selection industries trade with, and if there are separate results for which countries an industry imports from, and which countries the same industry exports to. This will hopefully clarify some of the trade implications between industries and countries, since countries and trade values are analyzed at a more individual level as opposed to only looking at trends. The figures are similar to figure 5 and 6 which displayed the trade values for all the industries. Here the industries are separated, and the values are not in logarithmic scale. Only the sectors of pulp, paper and cardboard production, chemical production, metal-production, and manufacture of motor vehicles will be presented in this section.

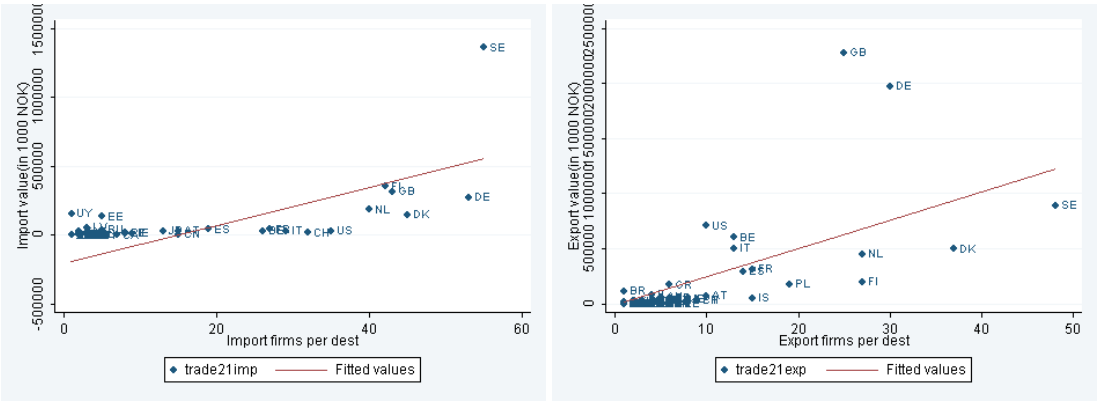

Figure 9 and 10. Pulp, paper and cardboard production. Trade value per destination by the number of trade partners, in absolute values. Import left and export right.

Figure 9 and 10 shows the industry for pulp, paper and cardboard production. Figure 9 gives the total imports per destination. Sweden is the largest trade partner on these accounts, both in total import value and the number of firms in Norway that trades with Sweden. Here Germany and Great Britain are actually below trend. Import per destination shows a lower trend than export per destination, with fitted values maximizing at 50 million NOK and 125 million NOK respectively. Figure 10 depicts total export per destination, where Great Britain and Germany are by far the largest trade partners with regards to export value. They are way above trend, which means that each firm in Norway is exporting relatively much to Germany and Great Britain compared to the other countries. Many Norwegian firms are exporting to Sweden, but the total export value is not much higher than that of the US and Belgium.

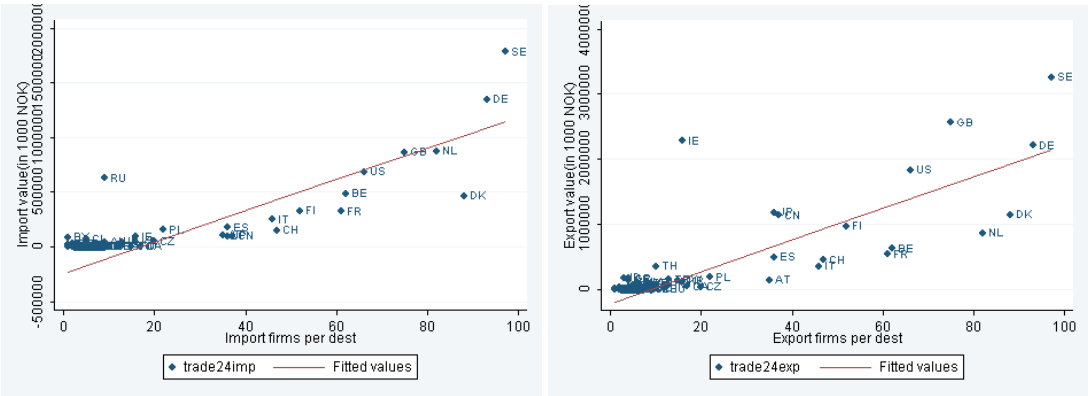

Figure 11 and 12. Chemicals and chemical products. Trade value per destination by the number of trade partners, in absolute values. Import left and export right.

The industry for chemicals production is displayed in figure 11 and 12, where figure 12 shows export value and figure 11 shows import value. Sweden is the largest export destination for chemical products, and Great Britain, Ireland and Germany are also buying a lot of chemicals from Norwegian firms. Denmark is buying chemicals from many Norwegian firms, but the total value of their purchases is not very high compared to other countries buying from equally many firms. Only the import side, Norwegian firms are buying chemicals in great value from Sweden and Germany (so it could look as though the same products are traded back and forth between Norway and Germany, and Norway and Sweden). Denmark is once again far below trend on import value relative to the number of Norwegian firms that import from Denmark.

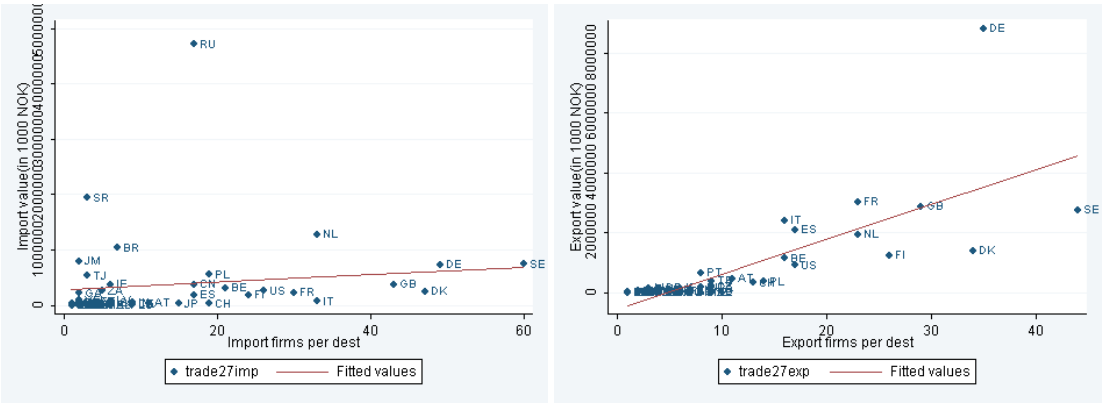

Figure 13 and 14. Metal-production. Trade value per destination by the number of trade partners, in absolute values. Import left and export right.

Imports are shown in figure 13, where Russia is by far the largest trade partner with regards to import value. Suriname in South-America has the second largest import value, but only a few Norwegian firms are importing from this country. Suriname is a country that is well endowed with bauxite used in aluminium production[21]. Norwegian firms are exporting a large share of their metal products to Germany – as can be seen from figure 14. A lot of Norwegian firms in the metal-production industry are exporting to Sweden and Denmark as well as Germany, but the values of the exports are far lower in these two countries.

[21] http://www.state.gov/r/pa/ei/bgn/1893.htm

From looking at figure 13; the line for fitted values is almost horizontal, which could mean that the number of firms importing from a country is not that strongly correlated with the import value per destination in the metal-production sector. This might stem from the fact that Russia and Suriname are the biggest trade partners on imports in metal-production, while both countries have quite few firms trading with them.

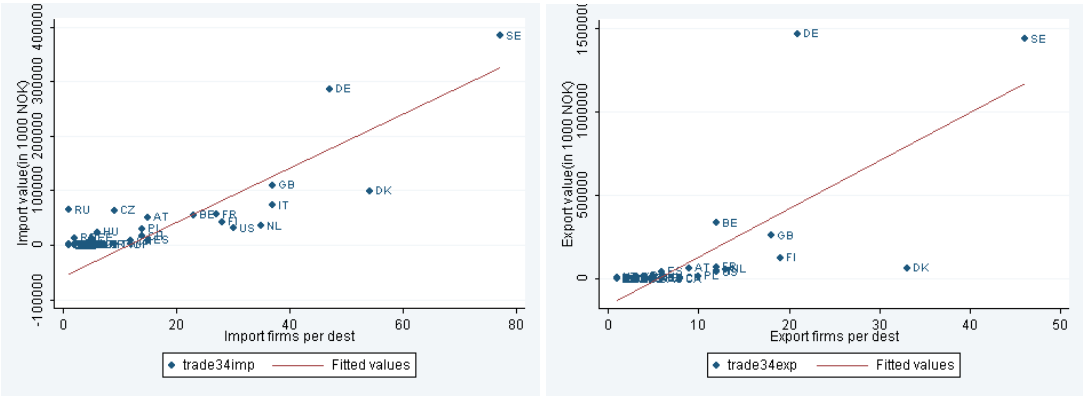

Figure 15 and 16. Manufacture of motor vehicles. Trade value per destination by the number of trade partners, in absolute values. Import left and export right.

As mentioned with regards to table 14, the sector of motor vehicle production had relatively few average trade partners per firm compared to the rather high average values of imports and exports (in table 11). From figure 15 and 16 it is evident that a few countries stand out as the most intensive trade partners (with many countries gathered in a "bulk" in the interval of 1-15 trade partners per destination). Sweden and Germany are the largest trade partners in imports, and Denmark again has many countries trading there, but not too high trade values. Germany and Sweden are also the largest on the export side, and Germany actually outruns Sweden in total export value, even though Germany has fewer firms exporting there. Denmark is once again small in export value, but one of the largest in the number of firms.

Looking at how different industries in Norway trade with countries, it is evident that Norway often import a great deal of – more or less - the same products from a country as they export to. Paul Krugman has published articles on this subject

of trade in similar products and between similar economies[22], which can not be explained by traditional trade theory (e.g. Ricardo and Heckscher-Ohlin theories). Sweden and Germany are often appearing as large trade partners on both the export side and the import side in the same industries, and even though imports are mainly trade in intermediates and exports are mainly trade in finished goods, the technologies and input-intensities are often the same in intermediate- and finished-good-production. The trade back-and-forth can thus be explained by the theories of Paul Krugman (1980); countries of similar economies trading in similar products do so because of imperfect competition and economies of scale.

The figures of this last section were meant to give better insight to trade in certain industries, and allow for a better understanding of which countries the given industries trade with. Even though Sweden and Germany imported and exported in similar manners in some industries, there were different results from looking at import values and export values for most countries. Since import is such an important part of Norwegian industry (with 27 % of all firms in the selection only importing), import partners and the values of imports is an interesting feature of trade – in addition to export partners and export values.

Another subject to reappear was the low performance of Denmark when comes to trade values. Denmark is Norway's second largest trade partner after Sweden in the number of firms trading with a country, but only fourth largest when counting total trade value (seen in table 23) – almost outrun by the US as well. This reappears in the trade within industries of figure 9-16. Sweden often has the largest trade values, while Denmark has relatively low trade values. Even though Denmark and Norway are separated by an ocean, the two countries are very close by boat, and it is rather peculiar that the trade values are so low compared to Sweden when all three countries are Scandinavian and presumably similar in culture and habits. These peculiar trade relations might become clearer by knowing more about the firms in the various destinations, and could thus be an interesting topic for further research if having access to this type of information.

[22] Paul Krugman (1980)

6 Conclusion

In this thesis I have tried to shed light on the general effects of imports in the Norwegian manufacturing, and how these differ from export effects. Exports have been an important contribution to the empirical research on international trade for many years, while imports have mostly been disregarded.

In the first part I compared import behaviour to the study made by Bernard and Jensen (1995) on export behaviour in firms. Firms that only import showed to be quite numerous in the Norwegian industry, especially compared to firms that only export. Firms that only import also reported higher average values of wages, employees, value added, and revenues than firms that do not trade, in accordance with the earlier research of firms that export. With regards to efficiency and profits to the economy, decision makers should therefore include the effects of imports when making trade agreements. The relationship between the number of trade partners in imports and values of revenue, wage, value added, etc. was on the other hand not that clear, which could mean that the number of countries Norway trades with is of less importance.

In the second part I looked at which industries the firms that only import belong to, and saw that most of them were in capital-intensive sectors, and mainly the largest sectors in Norwegian manufacturing. This could mean that firms that only import are mostly capital-intensive, with high technology and knowledge-base. These are often the types of sectors mentioned as important for Norway, in scare of resting on our oil-fortune. If thus imports are important for these sectors, import facilitation should be included in policy-making with regards to these sectors and political emphasis.

The last part was a closer look on how trade partners and the different countries interact with firms that import. This part shows that several variables do in fact increase with the number of only import trade partners – though not to the same degree as with both import and export partners. Figures showed that imports and trade intensities followed much of the same trends as those of export intensities, and that the direction of the behaviour in firms that import is very similar to the direction of the behaviour in firms that export.

This thesis shows that there is no reason for excluding the impact of firms that only import from the discussion of international trade, and one can almost wonder why there has been done so little research on them. It is clear that firms that both import and export (which are probably the type of firms that the previous writings are about) show larger differences to firms that do not trade, than what is the case for firms that only import versus firms that do not trade. Using only firms that import and export in analyses might therefore provide a clearer statement for decision makers and politicians. Even though: since firms that only import are rather many in number, it is interesting to see what values they are creating for the economy, and which industries they belong to. Import values should also be accounted for to get a broader picture of Norway's trade partners, since export destinations are not necessarily the same as the import origins.

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